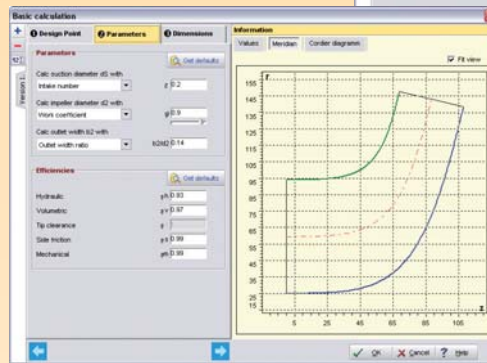
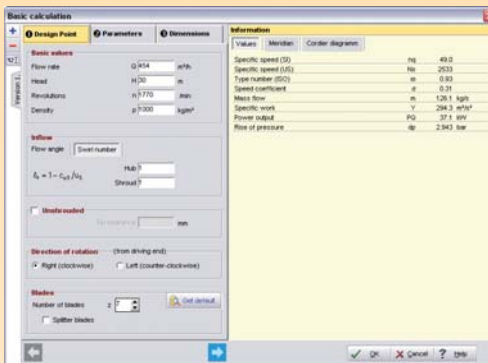
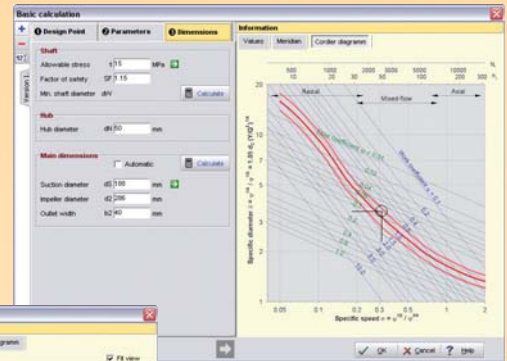


## PUMPS – MAJOR DESIGN STEPS

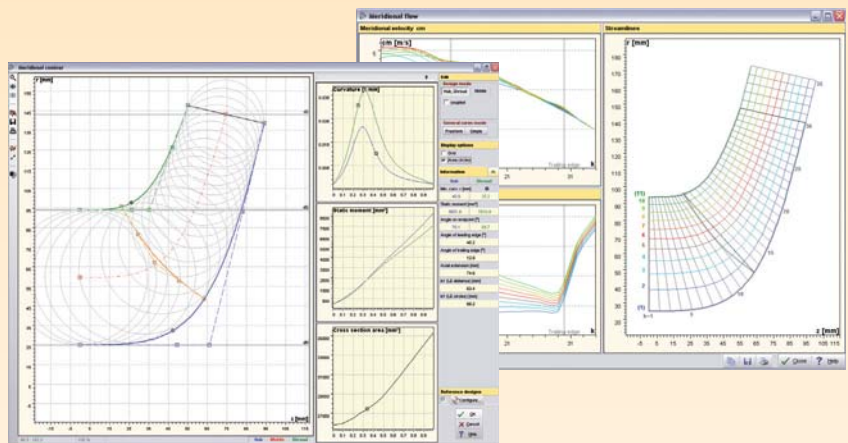
### 1. Main dimensions

- Computation of the impeller main dimensions: hub diameter, suction diameter, impeller diameter, outlet width
- Use of built-in or user-defined approximation functions for determination of pump parameters



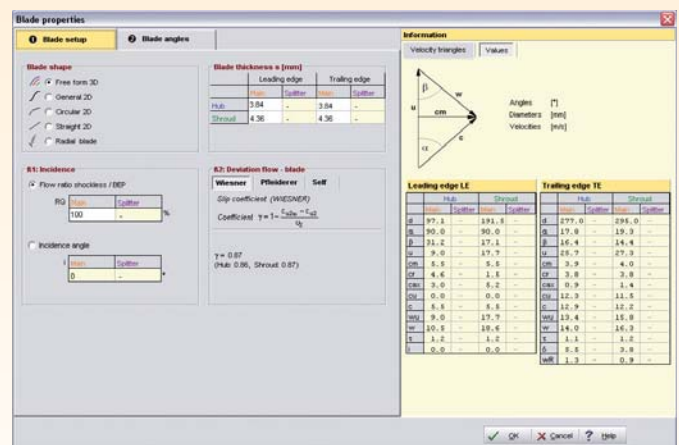
### 2. Meridional contour

- Design of meridional contour by Bezier-splines, arcs and lines or user-defined polylines
- Positioning of straight or curved leading edge
- Display information pertaining to important geometrical parameters
- Computation of the meridional flow by a simple streamline curvature method; display of velocity distributions



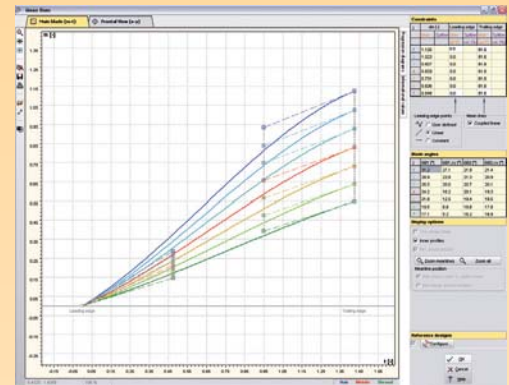
### 3. Blade angles

- Selecting blade shape: Free form 3D, General 2D, Circular 2D, Straight 2D, Ruled surface blades, Radial element blades
- Blade design on 2 to 11 meridional flow sections
- Computation of optimal blade angles considering the contraction of the flow channel and the slip factor
- Display velocity triangles and tabular listing of velocity components and flow angles



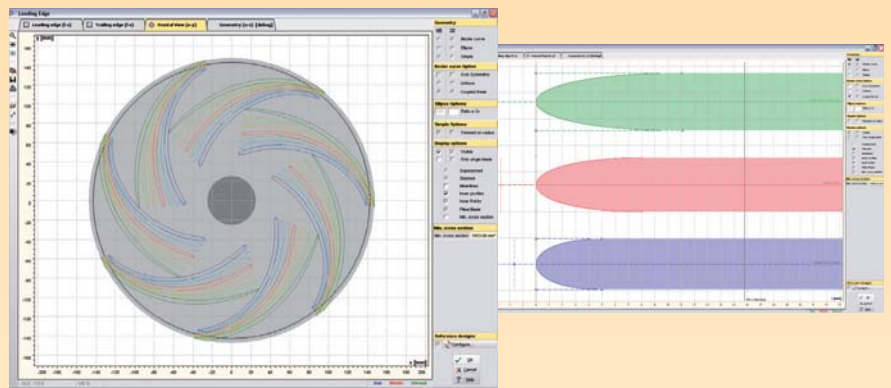
**4. Mean lines**

- Definition of mean lines by Bezier splines or user-defined polylines
- Coupled or non-coupled manipulation of blade shape
- Free choice to determine the wrap angle
- Display of blade angle distributions



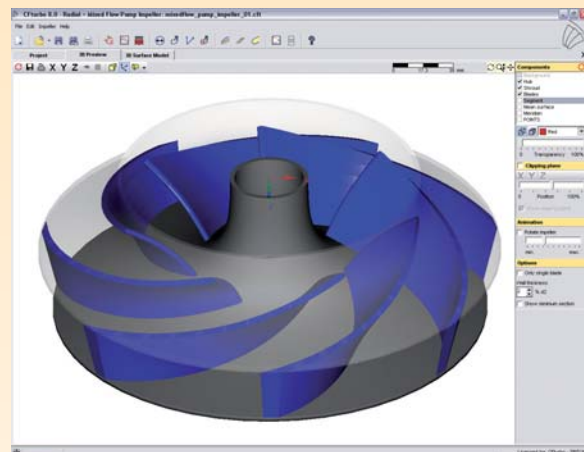
**5. Blade profiles, leading edges**

- Specification of blade thickness on all profile sections
- Round leading edges by Bezier splines or ellipses
- Display of designed impeller in frontal view



**6. 3D-views**

- Dynamic 3D-representation (rotate, move, zoom)
- Partial views
- Cutting plane
- Assembly view



**7. Data export**

- Neutral formats like IGES, STEP, DXF
- Direct interfaces to major CAD- and CAE/CFD-systems
- Special export formats available on customer request

**8. Performance map estimation**

- Computation of fundamental losses for impeller and volute by empirical relations
- Performance curve display for different speed
- Various possibilities to set-up and to show relevant values on diagram

